We claim:

1. A process for partially oxidizing propene to acrolein in the gas phase under heterogeneous catalysis by conducting a starting reaction gas mixture comprising propene, molecular oxygen and at least one inert gas, and containing the molecular oxygen and the propene in a molar O_2:C_3H_6 ratio of $\geq$ 1, in one reaction stage over a fixed catalyst bed which is arranged in two spatially successive reaction zones A, B, the temperature of reaction zone A being a temperature in the range from 290 to 380°C and the temperature of reaction zone B likewise being a temperature in the range from 290 to 380°C, and whose active composition is at least one multimetal oxide comprising the elements Mo, Fe and Bi, in such a way that reaction zone A extends up to a conversion of propene of from 40 to 80 mol% and, on single pass of the starting reaction gas mixture through the entire fixed catalyst bed, the propene conversion is $\geq$ 90 mol% and the selectivity of acrolein formation, based on converted propene, is $\geq$ 90 mol%, the chronological sequence in which the starting reaction gas mixture flows through the reaction zones corresponding to the alphabetic sequence of the reaction zones, wherein

   a) the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is < 160 l (STP) of propene/l of fixed catalyst bed·h and $\geq$ 90 l (STP) of propene/l of fixed catalyst bed·h,

   b) the volume-specific activity of the fixed catalyst bed is either constant or increases at least once in the flow direction of the reaction gas mixture over the fixed catalyst bed, and

   c) the difference $T^{maxA} - T^{maxB}$, formed from the highest temperature T^{maxA} which the reaction gas mixture has within reaction zone A and the highest temperature T^{maxB} which the reaction gas mixture has within reaction zone B, is $\geq$ 0°C.

2. A process as claimed in claim 1, wherein the difference $T^{maxA} - T^{maxB}$ is $\geq$0°C and $\leq$80°C.

3. A process as claimed in claim 1, wherein the difference $T^{maxA} - T^{maxB}$ is $\geq$3°C and $\leq$70°C.

4. A process as claimed in claim 1, wherein the difference $T^{maxA} - T^{maxB}$ is $\geq$20°C and $\leq$60°C.

5. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is $\geq$90 l (STP) of propene/l·h and $\leq$155 l (STP) of propene/l·h.

6. A process as claimed in any of claims 1 to 4, wherein the hourly space velocity of the propene contained in the starting reaction gas mixture on the fixed catalyst bed is $\geq$100 l (STP) of propene/l·h and $\leq$150 l (STP) of propene/l·h.

7. A process as claimed in any of claims 1 to 6, wherein the active composition of the fixed catalyst bed is at least one multimetal oxide of the general formula I

$$Mo_{12}Bi_aFe_bX^1_cX^2_dX^3_eX^4_fO_n \qquad (I)$$

where the variables are defined as follows:

X^1 = nickel and/or cobalt,
X^2 = thallium, an alkali metal and/or an alkaline earth metal,
X^3 = zinc, phosphorus, arsenic, boron, antimony, tin, cerium, lead and/or tungsten,
X^4 = silicon, aluminum, titanium and/or zirconium,

a = from 0.5 to 5,
b = from 0.01 to 5, preferably from 2 to 4,
c = from 0 to 10, preferably from 3 to 10,
d = from 0 to 2, preferably from 0.02 to 2,
e = from 0 to 8, preferably from 0 to 5,
f = from 0 to 10 and
n = a number which is determined by the valency and frequency of the elements other than oxygen in I.

8. A process as claimed in any of claims 1 to 7, wherein the volume-specific activity of the fixed catalyst bed increases at least once.